EXD.

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A REVISION OF THE MALAYAN SPECIES OF *RAPALA* MOORE (LEPIDOPTERA: LYCAENIDAE)

By A. Steven Corbet, F.R.E.S.

The high degree of individual and geographical variation which characterises many of the species of *Rapala* is doubtless responsible for the unsatisfactory arrangement of the genus in Seitz' monograph (1927, *Grossschmett. Erde* **9** : 1001–1007), which omits several names and is based largely on Fruhstorfer's papers (1911, *Berlin. ent. Z.* **56** : 253–263 and 1913, *Deuts. ent. Z.* "*Iris*," **37** : 177–178). Toxopeus (1929, *Tijd. Ent.* **72** : 222–224) published an annotated list of the Javanese species, but he followed Seitz in separating *R. pheretima* into three "species," and Evans (1932, *Ident. Indian Butt.* : 296–300) gave a key for the Indian forms.

The Malaysian representatives of the *Rapala* species usually differ distinctly from the corresponding Indian and Burmese forms; although there is little tendency for the Malaysian forms to show much geographical differentiation among themselves, the Bornean race of *R. dioetas* is remarkable in that the orange-red patch of the fore-wing is obsolete. Of the Malaysian species now listed, all are now known from the Malay Peninsula, Sumatra, Java and Borneo, except that *R. subguttata* has not been recorded from Sumatra or Borneo, *R. drasmos* is known only from Malaya and Borneo, *R. rhodopsis* only from Sumatra and Borneo and *R. rhoda* only from Sumatra and Java.

I can find no satisfactory means of separating *Virachola* Mre. from *Rapala* Mre. on venation or secondary sexual characters. Nevertheless, the Indo-Malayan species which are usually placed in the former genus are more robust insects and differ somewhat in facies and it appears preferable to keep them separate pending a thorough revision of the Lycaenidae genera.

Examination of the male genitalia.

In *Rapala*, the claspers are comparatively small and rather uniform in pattern, although there appears to be present a certain degree of individual and geographical variation in size and in the depth of the cleft: the posterior extremity of the large aedeagus is sufficiently distinct in some species to serve as a reliable specific character.

The claspers of *R. subguttata* are distinctive in the terminal hook, and in *R. abnormis* are narrow, cylindrical and deeply cleft. In the three allied species, *R. dioetas*, *R. dieneces* and *R. drasmos*, the claspers are long, tapering and deeply cleft, while the aedeagus has a prominent thorn-like process, and the genitalia of *R. pheretima* show the same general features. *R. hades*, *R. rhoda* and *R. rhodopsis* appear to be specifically distinct, although the genitalia show no remarkable differences: *R. manea*, *R. scintilla* and *R. varuna* constitute another group showing similarity in facies and in male genitalia.

There appear to be no differences in the male genitalia corresponding to the presence or absence of a brand on the upperside of the fore-wing in *R. sphinx*. In *R. rosacea* the claspers are broader and more deeply cleft than in the allied *R. nissa*.

Key for the separation of the Malaysian species of *Rapala* Mre.

1 (5). Un pattern abnormal, not comprising markings as in 5.

subguttata group.

2 (3). Un purple-brown, purple washed, with large dark spots, edged with white, and arranged as in *Arhopala* Bsdv. . . . . *subguttata*.

abnormis group.

3 (4). Un pale ochreous with brown markings comprising a large, rounded discal spot, a broad post-discal band and a broad distal border on both wings . . . . . *abnormis*.

kessuma group.

4. Un pale brown, with narrow white lines arranged as in *Jamides* Cr. *kessuma*.

5. Un pattern normal comprising a cell-end bar, post-discal band and rather indistinct submarginal band on each wing.

6(27). UnF post-discal band curved and more or less parallel to the distal margin.

7(20). Up red, reddish-brown or brown in ♂, and brown in ♀ (except *pheretima* ♀). ♂ unF with tuft at mid dorsum.

pheretima group.

8 (9). Un with a broad bar at cell-end and in middle of cell on both wings (not always present in ♀). ♂ up brownish-red with black apical border, or dark reddish-brown. ♀ up dull, steely blue, or purple blue, shading to black at wing margins. ♂ tuft ochreous . . . *pheretima*.

9 Un without a central cell-bar on both wings.

10(18). Un post-discal line single, only white edged outwardly.

dioetas group.

11(14). Un ochreous. H lobe yellow.

12(13). Un ochreous yellow. ♂ tuft orange-yellow. UnH black subtornal spots narrowly orange crowned. ♂ up orange-red to orange-brown, with costa, termen and inner margin broadly black bordered on F (the orange-brown patch becoming obsolete in the Bornean race). ♀ up dark brown . . . . . *dioetas*.

13. Un brownish ochreous. ♂ tuft dark brown. UnH black subtornal spot in space 2 broadly orange crowned. ♂ up coppery red with F broadly black bordered as in *dioetas*. ♀ up dark brown . . *dieneces*.

14(17). Un grey in ♂, paler grey in ♀.

15(16). UpH lobe yellow. UnH black spot in space 2 narrowly yellow crowned. ♂ up coppery red with broad black bordering on F as in *dieneces*. ♀ up dark brown, with pale orange-brown discal patch on F, on which the veins are dark dusted . . . . . *drasmos*.

melampus group.

16. UpH lobe orange-red. UnH black spot in space 2 broadly crowned with orange-red. ♂ up dull coppery red, with distal border decreasing to tornus and not continued along inner margin. ♀ up reddish-brown . . . . . *melampus*.

rhodopsis group.

17. Un brown with an ochreous hue. Up dark reddish-brown, ♂ usually with dark orange-red discal areas, on which the veins are dark dusted. UnH space 1c heavily dusted with greenish-blue . . . *rhodopsis*.

18. UnF post-discal lines double, white edged on both sides.

19. Un and up coloured as in *rhodopsis*. UnH with post-discal band broken at vein 6 and upper portion moved inwards . . . . . *rhoda*.

20. Up some shade of blue in both sexes.

21(26). Up dull. ♂ upF with brownish stigma along veins 2, 3 and 4.

varuna group.

22(25). Un post-discal bands narrow as usual, and whitened outwardly. ♂ up dark slate blue, shot deep blue. ♀ up dull purple-blue, shading to black at wing margins.

23(24). Un brown to purple-brown, usually purple washed. ♂ up shot purple-blue in inner half of F and most of H; tuft pale reddish-brown. ♀ up wing bases purple . . . . . *manea.*

24. Un greyish-brown, with a greenish hue in ♂, and tending to ochreous brown in ♀. ♂ upH shot blue; tuft dark brown. ♀ up wing bases greenish . . . . . *scintilla.*

25. Un post-discal bands broad, white edged on both sides. ♂ up dark, shining, greenish, indigo blue, shading to a broad black apical border on F; tuft dark brown. ♀ up purple-blue, shading to black at wing margins . . . . . *varuna.*

sphinx group.

26. Up bright shining blue. Un with very dark, broad, post-discal bands, not white edged. ♂ tuft dark brown . . . . . *sphinx.*

27. UnF post-discal band straight to vein 2 and directed towards tornus.

nissa group.

28. Up dark steely blue, paler in ♀, with broad, black, apical border on F, sometimes with a prominent orange discal patch on F . . . *nissa.*

Rapala subguttata malaya (Pendl. & Cbt.).

Rapala subguttata Elwes, 1892, *Proc. zool. Soc. Lond.* **1892** : 644, pl. xliv, f. 1 ♂; East Pegu.
Virachola malaya Pendlebury & Corbet, 1933, *J. F.M.S. Mus.* **17** : 404; ♀, Malay Peninsula.

The only female of *R. subguttata* known to me is the holotype of *malaya* from Bukit Kutu. The male of *malaya* is described for the first time.

♂. *Upperside.* Deep violet-blue, with costal and distal borders on both wings and inner margin on hind-wing broadly shaded with brownish-black. The hind-wing oval brand, which extends below vein 6 into the cell, is dusted with green metallic scales.

Underside. Pale purple-brown, washed with violet. The markings, which are deep purple-brown in the upper halves, and become paler in the lower halves of the wings, are arranged as in the female : they are twice as broad as in the nominotypical form, in which the post-discal spots are obsolete on the fore-wing and in the costal half of the hind-wing.

Wing expanse 31·5 mm.

Neallotype. Malay Peninsula : Pahang, Bukit Jeriau, 4100 feet, 30.v. 1937 (*C. F. Cowan*). In my collection.

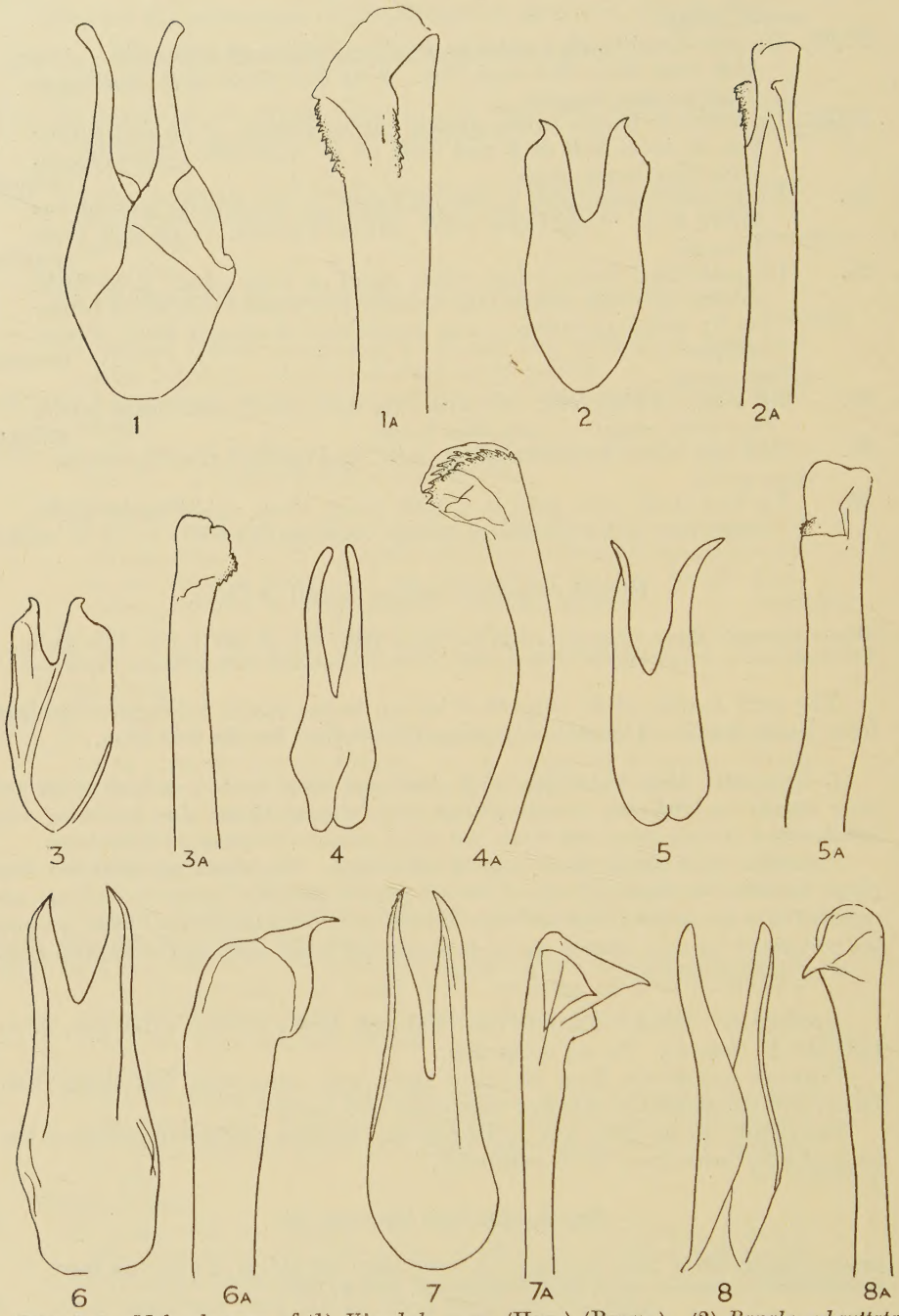
Burmese specimens from Maymyo agree with *subguttata*, but those from Tavoy are intermediate between *subguttata* and *malaya*.

The figure 127 on plate xxv in Piepers and Snellen appears to represent the male of a Javanese race of *R. subguttata*.

Rapala abnormis abnormis El.

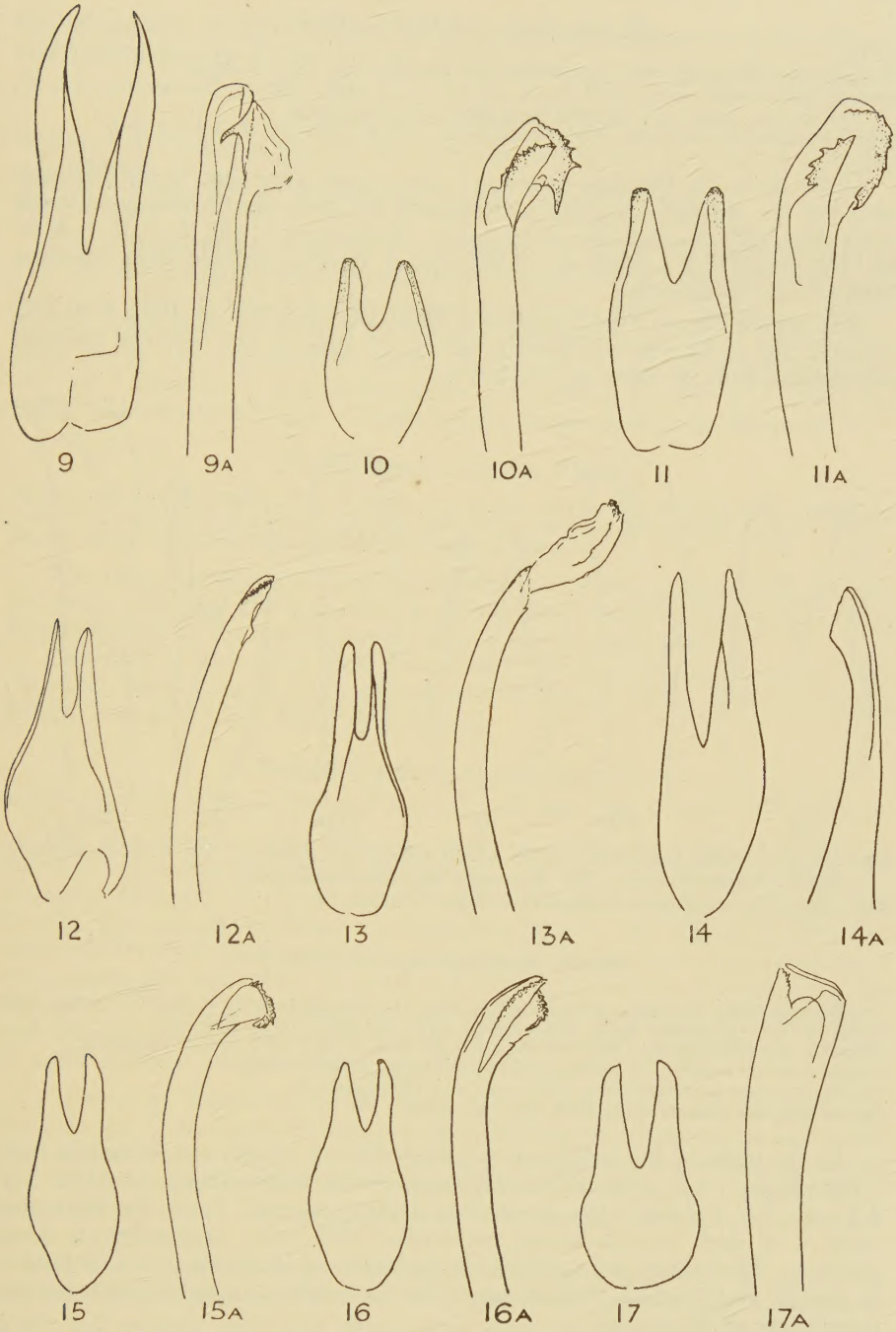
Rapala abnormis Elwes, 1892, *Proc. zool. Soc. Lond.* **1892** : 642, pl. xliv, f. 2 ♂; East Pegu.
Rapala abnormis abnormis Seitz, 1927, *Grossschmett.* Erde **9** : 1007.

R. abnormis, which is locally common on some of the hill tops in Malaya, shows little variation throughout Malaysia. The West Javanese race *abusina* Fruh. is figured in Seitz, pl. 160 d 3 und. and in Piepers and Snellen, pl. xxv, f. 136.



FIGS. 1–8.—Male claspers of (1) *Virachola perse* (Hew.) (Burma); (2) *Rapala subguttata subguttata* El. (Burma, Maymyo); (3) *R. subguttata* El. (Burma, Tavoy); (4) *R. abnormis abnormis* El. (Malaya); (5) *R. kessuma deliochus* (Hew.) (Malaya); (6) *R. pheretima sequeira* (Dist.) (Malaya); (7) *R. dioetas suffusa* (Mre.) (Burma, Mergui); (8) *R. dieneces dieneces* (Hew.) (Burma, Tavoy).

FIGS. 1a–8a.—Aedeagus of the above *Virachola* and *Rapala* forms.



FIGS. 9–17.—Male claspers of (9) *R. drasmos cowani* subsp. n. (Malaya); (10) *R. melampus melampus* (Cram.) (India, Mhow); (11) *R. melampus iarbus* (F.) (Burma); (12) *R. rhodopsis* Nic. (Sumatra); (13) *R. rhoda sarata* Fruh. (Java); (14) *R. hades* (Nic.) (Burma, Ataran); (15) *R. manea chozeba* (Hew.) (Sumatra) holotype; (16) *R. scintilla scintilla* Nic. (Sikkim); (17) *R. varuna orseis* (Hew.) (Malaya).

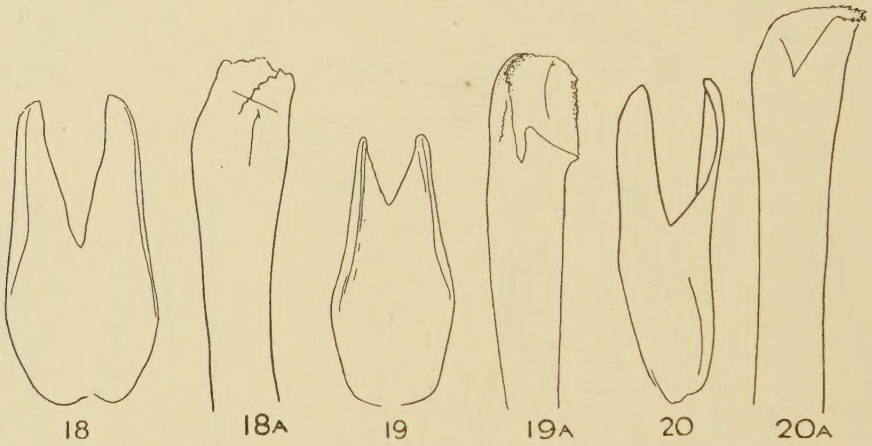
FIGS. 9a–17a.—Aedeagus of the above *Rapala* forms.

Rapala kessuma deliochus (Hew.).

Thecla kessuma Horsfield, 1829, *Descr. Cat. Lep. Mus. E.I. Co.* : 89; ♀, Java.
Deudorix deliochus Hewitson, 1874, *Trans. ent. Soc. Lond.* **1874** : 352; ♂, East India : 1878, *Ill. diurn. Lep. Suppl.* : 31, pl. va, f. 68 & 69 ♂; ♂♀, East India.
Rapala kessuma deliochus Seitz, 1927, *Grossschmett. Erde* **9** : 1007, pl. 146B d 8 ♂ und.

In the male, the Burmese form has a more purple tone than in the Javanese race, but the difference is slight : the female is a dull, purple-blue in *deliochus* and a clear, pale greenish-blue in *kessuma*. Pendlebury (1936, *J. F.M.S. Mus.* **18** : 185) found that neither sex of Malayan *R. kessuma* differed from *deliochus*, except in the smaller size.

The nominotypical form is figured in Seitz, pl. 146 h 5 ♀, pl. 160 g 4 ♂ und., 5 ♀ und. and in Piepers and Snellen, pl. xxv, f. 126a ♂, b ♀, and the Bornean race *throana* Fruh. in Seitz, pl. 146 h 6 ♀.



Figs. 18–20.—Male claspers of (18) *R. sphinx sphinx* (F.) (Siam); (19) *R. nissa nissoides* Swinh. (Upper Burma); (20) *R. rosacea* Nic. (Assam, Khasi).
Figs. 18a–20a.—Aedeagus of the above *Rapala* forms.

Rapala pheretima sequeira (Dist.).

Deudorix pheretima Hewitson, 1863, *Ill. diurn. Lep. Lyc.* : 21, pl. ix, f. 27 ♀, 28 & 29 ♂; Sarawak.
Deudorix sequeira Distant, 1885, *Rhop. Malay.* : 278, pl. xxiii, f. 21 ♀, Malacca.
Deudorix utimutis Distant, 1885, *tom. cit.* : 279, pl. xxiii, f. 22 ♂; ♂♀, Malay Peninsula.
Rapala petosiris sequaira [*sic*] Seitz, 1927, *Grossschmett. Erde* **9** : 1003.
Rapala pheretima pheretima Seitz, 1927, *tom. cit.* : 1003 (*partim*).
Rapala utimutis utimutis Seitz, 1927, *tom. cit.* : 1003.

In the male of the subspecies *petosiris* (Hew.), which was described from " East India " and extends from Sikkim to South Burma (Seitz, pl. 146 b 5 ♂, 6 ♂ und., 7 ♀, 8 ♀ und.), the upperside is dull coppery red, but in the Malaysian races it is dark reddish-brown, sometimes with paler orange-brown discal patches. The middle cell spots on the underside of the female may be present or absent, and this is a further reason for the confusion existing with the nomenclature of the species.

The Bornean subspecies *pheretima* (Hew.) (= *guevara* Fruh.) **syn. n.**,[1] is

[1] The holotype of *guevara* is a male, and not a female as Fruhstorfer supposed. In the figure e 2 on plate 160, the pale areas on the upperside are incorrectly shown as bright coppery red, instead of dull orange-brown.

figured in Seitz, pl. 160 e 2 ♂, 3 ♂ und., 4 ♂, 5 ♂ und., and *sakaia* Fruh. (Piepers and Snellen, pl. xxv, f. 128 ♀) is the Javanese race.

Rapala dioetas barthema (Dist.).

Deudorix dioetas Hewitson, 1863, *Ill. diurn. Lep. Lyc.* : 21, pl. vii, f. 14 ♂, 13 & 15 ♀; Celebes, Macassar.
Deudorix barthema Distant, 1885, *Rhop. Malay.* : 280; ♀, Malay Peninsula.
Rapala barthema Seitz, 1927, *Grossschmett. Erde* **9** : 1006, pl. 160 d 4 ♀, 5 und.

The conspecificity of *dioetas* (Hew.) (Seitz, pl. 160 i 1 ♂ und., 2 ♀ und., h 9 ♂) and *suffusa* (Mre.) (Burma) has been confirmed by examination of the male genitalia. Other Malaysian subspecies are *litunia* Fruh. (= *praxeas* Fruh.) **syn. n.**, Java (Seitz, pl. 160 h 2 ♂; Piepers and Snellen, pl. xxv, f. 134a ♂, b ♀), *laima* H. H. Drc., Kina Balu, North Borneo (Seitz, pl. 147 c 4 ♂, 160 e 1 ♂ und. as " drasmos ") and *catulus* Fruh., Nias (Seitz, pl. 146 c 1 ♂, 160 h 3 ♂ und.). The female allotype of *laima* is a *R. dieneces* form from Sarawak.

Rapala dieneces dieneces (Hew.).

Deudorix dieneces Hewitson, 1878, *Ill. diurn. Lep. Suppl.* : 31, pl. va, f. 65, 67 ♂, 66 ♀; Singapore.
Deudorix xenophon Distant (*nec* Fabricius), 1886, *Rhop. Malay.* : 465, pl. xliv, f. 1 ♂.
Rapala xenophon dieneces Seitz, 1927, *Grossschmett. Erde* **9** : 1002.

The female allotype of *dieneces* appears to be conspecific with the male holotype, although the underside is greyer than usual in this species. The female figured by Distant represents that sex of *R. melampus*.

Two further Malaysian races described by Fruhstorfer are *mezetulus*, Java (Seitz, pl. 160 h 5 ♀ und., 6 ♂; Piepers and Snellen, pl. xxv, f. 135a ♂, b ♀) and *dazata*, Nias (Seitz, pl. 160 h 7 ♂, 8 ♂ und.).

Rapala drasmos cowani subsp. n.

Rapala drasmos H. H. Druce, 1895, *Proc. zool. Soc. Lond.* **1895** : 624, pl. xxxiv, f. 13 ♀; Labuan.

The nominotypical form is known to me only from the figure of the female which accompanies the original description : the male has remained unknown. Recently, Messrs. C. F. Cowan and J. N. Eliot obtained a series of a remarkable *Rapala* from mangrove forest on Singapore Island : the female is definitely conspecific with *R. drasmos*, and the male resembles *R. dieneces* above but has a very distinctive underside. It may well be that *R. drasmos* is confined to the mangrove association in Malaysia, where collecting is difficult and dangerous, and this accounts for its extreme rarity in collections.[2] I am glad to be able to name the new subspecies after one of its discoverers.

♂. *Upperside.* Resembles *dieneces* (Hew.) ♂, from Malaya, exactly, except that the fore-wing apex is more acute and the inner edge of the fore-wing broad, black, costal border does not pass straight through the cell, dividing it longitudinally, but entirely fills the cell from the base to the origin of vein 2, where it is upturned and reaches the distal border between veins 4 and 5. The black spot on the hind-wing lobe has only a minute yellow patch on its inner edge.

Underside. Plumbeous grey, surface slightly shining, and narrow cell-end bars double and only faintly indicated. The dark brown post-discal bands are narrow, outwardly faintly and narrowly edged with white; these bands are placed as in *dieneces* but are straighter. Both wings with obscure, submarginal shading. On the hind-wing, the lower end of the stripe comprising the post-discal band in space 2 is moved outwards,

[2] The plant associations in Malaya are discussed in Corbet, 1935, *Biological Processes in Tropical Soils* (Cambridge) : 25, and in Corbet, 1938, *Proc. R. ent. Soc. Lond.* (C) **3** : 42.

and the upper end of the contiguous stripe in space 3 is moved inwards slightly. The large black subtornal spot in space 2 is inwardly narrowly crowned with ochreous and the outer portion of space 1c is broadly dusted with bluish-grey scales. The hind-wing tail at vein 2 is slightly longer than in *dieneces*. Antennae also slightly longer. Body reddish-brown above, and pale buff below. Legs black and white ringed.

Wing expanse 30·5 mm.

Holotype. Malay Peninsula: Singapore, Sungei Jurong (mangrove), 28.ix.1938 (*C. F. Cowan*). In British Museum. Five other males, with wing expanses up to 35 mm., are similar.

♀. *Upperside*. Dark brown, with a pale, diffuse orange-red discal patch on the fore-wing, on which the veins are dark dusted; this patch being shorter and broader than in *drasmos* ♀ from Borneo (Seitz, pl. 146B d 9 ♀). On the hind-wing, the distal area is faintly washed with orange-red and here the veins are darkened.

Underside. Silvery grey, with the surface more matt than in the male, and without the yellow tinge found in *drasmos* ♀. Markings as in the male, but the post-discal band is more broadly white-edged.

Body and legs as in the male.

Wing expanse 30 mm.

Allotype. Malay Peninsula: Singapore, Sungei Jurong (mangrove), 28.viii.1938 (*C. F. Cowan*). In British Museum. Three other females, with wing expanses up to 34 mm., differ slightly in the extent of the orange-red colouring of the upperside.

Rapala melampus ocerta Fruh.

Papilio melampus Cramer, 1782, *Pap. Exot.* **4**: 142, pl. cccIxii, f. G. & H ♂; Coromandel Coast.
Deudorix jarbas Distant (*nec* Fabricius), 1885, *Rhop. Malay.* : 278, pl. xxiv, f. 15 ♂, pl. xx, f. 26 ♀ (poor).
Deudorix xenophon Distant (*nec* Fabricius), 1886, Rhop. Malay. : pl. xliv, f. 2 ♀.
Rapala manea ocerta Fruhstorfer, 1911, *Berlin. ent. Z.* **56**: 254; ♀, Singapore. Holotype figured by Distant, *tom. cit.*, pl. xliv, f. 2.
Rapala melampus jarbas Seitz (*nec* Fabricius), 1927, *Grossschmett. Erde* **9**: 1001.
Rapala manea ocerta Seitz, 1927, *Grossschmett. Erde* 9: 1006.
Rapala jarbus jarbus Corbet & Pendlebury, 1934, *Butt. Malay. Penin.* : 205, pl. xiv, f. 203 ♂.

R. melampus exhibits a considerable degree of variability both as regards facies and male genitalia, but there can be no doubt that *melampus* (Cram.) and *iarbus* (F.)[3] are conspecific. It appears as well to retain Fruhstorfer's name for the Malayan race as males from the Peninsula south of Kedah are usually of larger size than true *iarbus*.

The species occurs almost unchanged throughout Malaysia, but the Javanese form has been separated as *dekaiarchus* Fruh. (Piepers and Snellen, pl. xxv, f. 133a ♂, b ♀, 139b ♀) and the Niasese race *menaichus* Fruh. is quite distinct. In the form *yabala* Fruh., East Java and North-east Sumatra, the upperside has a much browner hue.

Rapala rhodopsis Nic.

Rapala rhodopsis de Nicéville, 1896, *J. Bombay nat. Hist. Soc.* **10**: 183, pl. T, f. 41 ♂, 42 ♀; North-east Sumatra, Battak Mountains.

This species is represented in the British Museum by a few males from Sumatra and a single female from Borneo.

[3] *Papilio iarbus* Fabricius, 1787, *Mant. Ins.* **2**: 68; ♂, Siam. The name is usually misspelt "jarbas."

Rapala rhoda Nic.

Rapala rhoda de Nicéville, 1896, *J. Bombay nat. Hist. Soc.* **10** : 184, pl. T, f. 43 ♂, 44 ♀; North-east Sumatra, Battak Mountains.

This and the preceding species are quite distinct from *R. hades* (Nic.),[4] which is confined to Burma, and has the upperside dark brown with pale orange discal patches, on which the veins are dark dusted on the fore-wing : the male lacks a hair tuft on the dorsum on the fore-wing beneath.

The nominotypical form of *R. rhoda* is known to me only from the original figures, but the species appears to be less rare in Java, where it is represented by the subspecies *sarata* Fruh. (= *ignota* Piep. and Snell.) (Seitz, pl. 160 g 1 ♀ und., and Piepers and Snellen, pl. xxvi, f. 141 ♂).

Rapala manea chozeba (Hew.).

Deudorix manea Hewitson, 1863, *Ill. diurn. Lep. Lyc.* : 23, pl. x, f. 40 ♂, 41 ♀ ; Celebes.
Deudorix chozeba Hewitson, 1863, *tom. cit.* : 24, pl. v, f. 47 & 48 ♂; Sumatra.
Rapala varuna chozeba Seitz, 1927, *Grossschmett. Erde* **9** : 1004, pl. 146 e 2 ♂, 3 ♂ und. (post-discal bands rather too broad).

There is not much geographical differentiation in this widely distributed species. The Malayan form resembles *chozeba* (Hew.) in the male : I have seen no females of *chozeba* but the Malayan female has the wing bases brighter blue and the under surface more deeply purple washed than in the same sex of the Burmese race (*schistacea* Mre.) which was described from Calcutta and is figured in Seitz, pl. 146 a 4 ♂, 5 ♀, 6 ♀ und.

It has been ascertained that the following represent *R. manea* subspecies : *asikana* Fruh. (= *beluta* Fruh.), West Java (Piepers and Snellen, pl. xxv, f. 130a ♂, b ♀), *renata* Fruh., East Java, *baweanica* Fruh., Bawean (Seitz, pl. 160 c 4 ♂, 5 ♀ und.) *ingana* Fruh., Borneo and *bandatara* Fruh., Bazilan (Seitz, pl. 160 c 6 ♂, 7 ♀ und.). The nominotypical form from the Celebes is figured in Seitz, pl. 146B g 5 ♂, 6 ♂ und.

Rapala scintilla scintilla Nic.

Rapala scintilla de Nicéville, 1890, *Butt. India, Burmah & Ceylon* **3** : 461 ; ♂, Sikkim.
Rapala scintilla Seitz, 1927, *Grossschmett. Erde* **9** : 1005, pl. 160 d 7 ♂, 8 ♀ und. (the ♂ fig. should show only the hind-wing blue shot).

Although usually Malaysian males are more fuscous above and have a greener hue, while the females lack the bright purple colour often present in the Sikkim form, some specimens from Malaya and Borneo are not separable from the nominotypical form. The Philippine race *nemana* Semp., described from East Mindanao and figured in Seitz, pl. 160 c 8 ♂, 9 ♂ und., is not very different. I have not seen the female holotype of *enganica* Fruh., Engano, which was described as a *R. manea* form, but imagine that it pertains to *R. scintilla*.

Rapala varuna orseis (Hew.).

Thecla varuna Horsfield, 1829, *Descr. Cat. Lep. Mus. E.I. Co.* : 91 ; ♂♀, Java.
Deudorix orseis Hewitson, 1863, *Ill. diurn. Lep. Lyc.* : 23 ; ♂, Sumatra.
Rapala varuna orseis Seitz, 1927, *Grossschmett. Erde* **9** : 1004.

Malayan examples are not separable from the Sumatran form. The nominotypical form is figured in Seitz, pl. 146 a 7 ♂, 8 ♂ und., 9 ♀ and in Piepers and

[4] *Hysudra*(?) *hades* de Nicéville, 1895, *J. Bombay nat. Hist. Soc.* **9** : 318, pl. P, f. 46 ♂; Tenasserim ; 1897, *J. asiat. Soc. Bengal* **66** : 560, pl. iv, f. 29 ♀; Burma.

Snellen, pl. xxv, f. 131a ♂, b ♀, and other *R. varuna* subspecies are *grisea* (Mre.), Dehra Dun, *zulkarna* Fruh., Central Java (Seitz, 160 f. 1 ♂ und.), *sagata* Fruh., Bawean (type locality) and East Java (Seitz, pl. 146 c 2 ♀ und., and Piepers and Snellen, pl. xxv, f. 132 ♀), *saha* Fruh., Borneo and *ambasa* Fruh., Nias (Seitz, pl. 160 f 7 ♂ und.).

Rapala sphinx rhoecus Nic.

Papilio sphinx Fabricius, 1775, *Syst. Ent.* : 520; India orientali.
Rapala rhoecus de Nicéville, 1895, *J. Bombay nat. Hist. Soc.* **9** : 319, pl. P, f. 47 ♂; North-east Sumatra; 1896, *tom. cit.* **10** : 182, pl. T, f. 40 ♀; North-east Sumatra.
Rapala sphinx rhoecus Seitz, 1927, *Grossschmett. Erde* **9** : 1005, pl. 161 b 3 ♂, 4 und.

The representatives of *R. sphinx* in Malaya, Sumatra and the Philippines are remarkable for a dark, triangular discal brand on the upperside of the fore-wing, this brand being absent as a rule in the other forms. The Javanese form (Seitz, pl. 160 e 6 ♂, 7 ♀ und., and Piepers and Snellen, pl. xxv, f. 129a ♂, b ♀) hardly differs from the nominotypical form from Siam, but the Bornean race has been separated as *melida* Fruh. (Seitz, pl. 160 e 8 ♀). The Philippine subspecies *elcia* (Hew.) is figured in Seitz, pl. 146B g 7 ♂ und., 8 ♂.

Rapala nissa pahangana Pendl. & Cbt.

Thecla nissa Kollar, 1844, in Hügel, *Kaschmir* **4** : 412, pl. iv, f. 3, 4; North India, Masuri.
Rapala nissa pahangana Pendlebury & Corbet, 1933, *J. F.M.S. Mus.* **17** : 404; ♀, Malay Peninsula.

This species, of which form *tacola* Fruh., from Assam, is figured in Seitz, pl. 160 g 6 ♂, is very rare throughout Malaysia : it is represented by *palamera* Fruh., Sumatra (Seitz, pl. 160 g 8 ♀) and *odosia* Fruh., Java, in the Sunda Islands.

Judging by the difference in the male clasper, *R. rosacea* Nic.[5] (Sikkim to Assam), with a deep rosy pink underside, is a distinct, although closely allied, species, which may be confused with faintly marked *R. subguttata* from the same localities.

The types of all the *Rapala* forms mentioned in this paper are in the British Museum, except *sphinx* F., *drasmos* H. H. Drc., *enganica* Fruh., *sarata* Fruh., and those forms described by Cramer, Kollar, de Nicéville, Piepers and Snellen and Semper. In the case of *barthema* Dist., however, only a syntype is present.

I am indebted to the Trustees of the British Museum (Natural History) for granting facilities for the study of their collections, and to Mr. H. M. Pendlebury, Director of F.M.S. Museums, and Messrs. C. F. Cowan and J. N. Eliot for the loan of specimens from their remarkably complete collections.

[5] *Rapala rosacea* de Nicéville, 1888, *J. asiat. Soc. Bengal* **57** : 285, pl. xiv, f. 12 ♂ ; ♂♀, Sikkim.

A REMARKABLE FLY FROM AN ANTS' NEST IN NEW ZEALAND (DIPT., CHLOROPIDAE)

By J. T. Salmon, M.Sc.

(*Dominion Museum, New Zealand.*)

Communicated by Dr. W. R. B. Oliver, F.R.E.S.

The first specimen of the fly described herein was sent to me by Mr. W. E. Moore, of Christchurch, during February, 1938. Later, in the following April, in response to my request, Mr. Moore found and forwarded a further specimen. Both specimens came from the Mount Grey Valley, each from a separate nest of the ant *Monomorium integrum* Forel.

There seems to be little doubt that the fly actually inhabits the ants' nest. In a letter to me the collector states : " The first specimen was taken in the

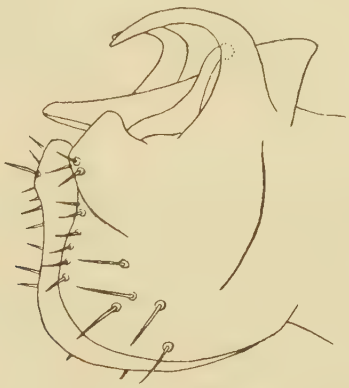


Fig. 1.—View of hypopygium from side and slightly to the rear.

middle of a large number of *Monomorium integrum*." Concerning the collecting of the second specimen he says : " On finding the nest I cut round it with a knife and lifted it entire, with as little superfluous turf as possible. The fly must have been in the nest or its immediate surroundings."

I take this opportunity to acknowledge valuable help given to me in the placing of this fly by Mr. A. L. Tonnoir, of the Division of Economic Entomology, Australian Council of Scientific and Industrial Research, Canberra.

The fly is most conveniently placed in the Chloropidae, and falls into the sub-family Oscinellinae. It does not, however, fall naturally into any known genus; and I propose to erect a new genus *Apterosoma* for its reception.

Apterosoma gen. n.

This genus, on account of its sub-apterous condition and well-developed head chaetotaxy, might be related to *Apteroscinis* Mall., on the one hand, and to *Lasiosina* Beck. on the other. It differs, however, from these in the absence of both the mesonotal furrows and the sensory area on the hind tibia.

Genotype: the following species :—

Apterosoma moorei sp. n.

Male. The general colour ochreous yellow, frontal triangle shining dark-ochreous, ocellar triangle slightly darker. Mesonotum with prominent dark-brown stripe tapering posteriorly and two broken, irregular stripes one on each side extending on to the margin of the scutellum. Abdomen, ochreous yellow, free of markings. Legs ochreous yellow. Eyes brick-red. Wings rudimentary and very small, hyaline. Halteres extremely small and reddish-brown. Body and legs evenly clothed with bristles, all bristles dark brown. Arista of antennae finely pubescent and dark brown in colour. Hypopygium small but its various parts well developed, the claspers and unci particularly so. (See fig. 1.) Length of body 1·5 mm.

Chaetotaxy of head. One inner and one outer vertical bristle to each side, two post-verticals, two ocellar, two large and four small fronto-orbital to each side. Numerous irregular small frontal bristles. Facial, vibrissal, and postorbital all absent.

Chaetotaxy of thorax. Two humeral, two notopleural, two supraalar, one intraalar, four scutellar, four irregularly-defined rows of small dorso-central and acrostical. All others absent. There are four large strong bristles arising from the costa of each wing rudiment around its base.

Holotype and paratype, male, in the Dominion Museum, New Zealand. Female unknown.

ON A NEW AND SOME LITTLE KNOWN EUROPEAN SPECIES OF *ARGE* SCHR. (HYMENOPTERA SYMPHYTA)

By Robert B. Benson, M.A., F.R.E.S.

(*Department of Entomology, British Museum (Natural History), London.*)

While investigating the high-mountain hymenopterous fauna in Valais, Switzerland, in June 1935, my wife and I collected two forms of *Arge* Schrank then unknown to me; one of these has since proved to be a new species related to *A. tergestina* (Kriechbaumer) and the other to be *A. alpina* (Konow) which is here treated as a subspecies of *A. nigripes* (Retz.).

I am much indebted to Dr. von Rosen of the Zoologische Sammlung des Bayerischen Staates, München, for the loan of the types of *Hylotoma tergestina* Kriechbaumer and also to Dr. V. V. Gussakovsky of Leningrad for representatives of various asiatic species otherwise unknown to me.

Arge stecki sp. n.[1]

♀. *Colour*: Head and thorax with appendages bluish-black, with fuscous pubescence; abdomen yellow except for the 1st and 2nd terga which are infuscate and the sawsheath which is black. Wings deeply infuscate, especially at base of fore-wing, with black stigma, costa and venation.

Length: 7·0 mm.; antenna 2·0 mm.

[1] Dedicated to the late Dr. Th. Steck, Librarian at Berne, Switzerland, and student of Swiss Hymenoptera, who guided us and accompanied us during part of our stay in Switzerland in 1935.

Head strongly swollen behind the eyes; mouth-parts normal; maxillary palp about 1 mm. long with the 4 apical segments almost equal in length; supraclypeal area semicylindrical without definite medial carina; median fovea rather shallow with strong lateral carinae; eyes small (about 0·40 mm. × 0·75 mm.); the smaller dimension less than 3 times greater than the length of the malar space which is longer than the 2nd antennal segment; posterior ocelli closer together than the distance between an ocellus and the eye margin (POL : OOL as 14 : 17); antenna subclavate and very short, being only about as long as the breadth of the head behind the eyes (fig. 7). *Wings* with 3rd transverse cubital vein but slightly diverging above from the second, so that the 3rd cubital cell is slightly longer above than below, and below is about twice as long as the 2nd cubital vein. *Hind* legs with basitarsus not longer than two following tarsal segments together; the 2nd tarsal segment longer than the apical one; ♀ sawsheath as in *A. pagana* (Panz.); saw (figs. 1 and 4).

♂ differs from ♀ in that the abdomen is black above except at the sides and on the apical tergum, and that the eyes are slightly larger with their smaller dimension about 3 times as long as the malar space, and the antenna is about 1½ times the breadth of the head (3·5 mm.) and normal in form.

Switzerland: Valais, Val d'Hérens, Ferpècle, 6000 ft. 1 ♀ (holotype), 14.vi.1935, and 1 ♂ (allotype), 21–27.vi.1935 (*R. B. Benson*) (British Museum).

This species is very closely related to *A. tergestina* (Kriechbaumer) from Italy, together with which it differs from all other *Arge* known to me by its very short subclavate antennae in the ♀. *A. tergestina* (Kriechbaumer, 1877) was arbitrarily and quite wrongly placed by Konow (1905) as a synonym of *A. pagana* (Panzer) from which species it is abundantly distinct, as can be seen in the original description. Such arbitrary synonymy was the usual practice in the works of Konow; many species described by other authors were not accepted by Konow unless he had specimens in his own collection, but were placed by him as synonyms of the nearest common species. In this way he was able to keep the field clear for his rapid and extremely useful (though incomplete) revisions of species.

A. stecki sp. n. and *A. tergestina* (Kriechbaumer) would both run down in Enslin's Monograph to couplet 21, containing *A. pagana* (Panzer) and *A. fuscipennis* (H.-S.). These four species and one subspecies can be separated as follows:—

1(4) Malar space shorter than 2nd antennal segment (less than ¼ the smaller dimension of the eye); supraclypeal area, with a medial carina above; ♀ flagellum scarcely ⅕ thicker in its thickest part than at its base and the whole antenna is about 1½ times as long as the breadth of the head behind the eyes (fig. 8). ♀ sawsheath not fuscous at apex and the saw has large backwardly projecting teeth from the side ridges of each segment (fig. VI in Servadei 1934).

[Hind basitarsus equal in length to next 3 tarsal segments together; POL less than OOL; 3rd cubital cell of fore-wing much wider above than below, the 3rd transverse cubital vein being directed almost towards the apex of the radial cell.]

2(3) Fore-wings densely smoky at base but less so at apex and on hind-wings; head, thorax and legs entirely black.

All Europe (except Britain) and northern Asia to Kamtchatka *pagana pagana* (Panzer).

3(2) Wings uniformly and slightly smoky; labrum, pronotum, sides of mesonotal lobes, upper parts of mesopleura, middle and hind coxae, femora and tibiae marked with yellow.

South of England. . . . . *pagana stephensi* (Leach).

4(1) Malar space longer, usually much longer than the 2nd antennal segment (more than $\frac{1}{3}$ the smaller dimension of the eye); supraclypeal area without a definite medial carina above; ♀ antenna subclavate and either only as long as the breadth of the head behind the eyes or with the flagellum at least $1\frac{1}{2}$ times thicker at its thickest part than at its base; ♀ sawsheath fuscous at its apex and saw without backwardly projecting teeth from its lateral ridges (cf. fig. 1).

5(6) Hind basitarsus equal in length to the 3 following tarsal segments together; 2nd tarsal segment shorter than the apical one; tibiae and tarsi all yellow; ♀ antenna $1\frac{1}{2}$ times as long as breadth of the head behind the eyes (fig. 9); fore-wings usually with a darker blotch below the stigma.

[3rd transverse cubital vein in fore-wing parallel with 2nd; 3rd cubital cell below about twice as long as 2nd transverse cubital vein; POL less than OOL. 8·0–11·0 mm. Central and South-Eastern Europe] *fuscipennis* (H.-S.).

6(5) Hind basitarsus equal to the 2 following tarsal segments together; 2nd tarsal segment longer than apical one; tibiae, at least in part and usually entirely, and tarsi entirely black; ♀ antenna equal in length to breadth of head behind the eyes (fig. 7); fore-wings without a darker blotch below the stigma.

7(8) 3rd cubital cell of fore-wing not longer above than below and scarcely longer than 2nd transverse cubital vein; POL = OOL; saw fig. 3. 8·0–9·5 mm.

Istria (Italy). . . . . *tergestina* (Kriechbaumer).

8(7) 3rd cubital cell longer above than below and twice as long below as the 2nd transverse cubital vein; POL less than OOL; saw fig. 4. 7·0 mm.

Mountains of Switzerland. . . . . *stecki* sp. n.

Arge nigripes alpina (Konow) (new combination).

A series of a black-bodied *Arge* with entirely hyaline wings was swept in boggy mountain pastures about Les Haudères in Valais, Switzerland, at 4000–5000 ft., from 6–27.vi.1935. These were at first thought to be a peculiar form of *A. ciliaris* (L.) differing from the normal representatives of this species by the long 3rd cubital cell in the fore-wings and the almost entirely piceous legs. A study of the saws showed that they differed markedly in the shape of the teeth from those of *A. ciliaris* (L.) but were indistinguishable from those of the *ustulata–fuscipes–nigripes* complex (figs. 5 and 6); they agreed with *A. nigripes* (Retzius) in the narrower form of sawsheath than occurs in *ustulata* (L.) and *fuscipes* (Fallén) and apparently represent a hyaline-winged alpine subspecies of *A. nigripes* (Retzius). The form was described as a species *A. alpina* by Konow and wrongly placed by Enslin (p. 602) as a variety of *A. fuscipes* (Fallén).

In 12 ♀♀ and 1 ♂ of my series the pubescence on the head and thorax is silvery white, while in 2 ♀♀ and 6 ♂♂ it is fuscous as in the smoky-winged forms of *A. nigripes* (Retzius); the wings are entirely hyaline except for a small spot at the extreme base of the radial cell of the fore-wing under the stigma.

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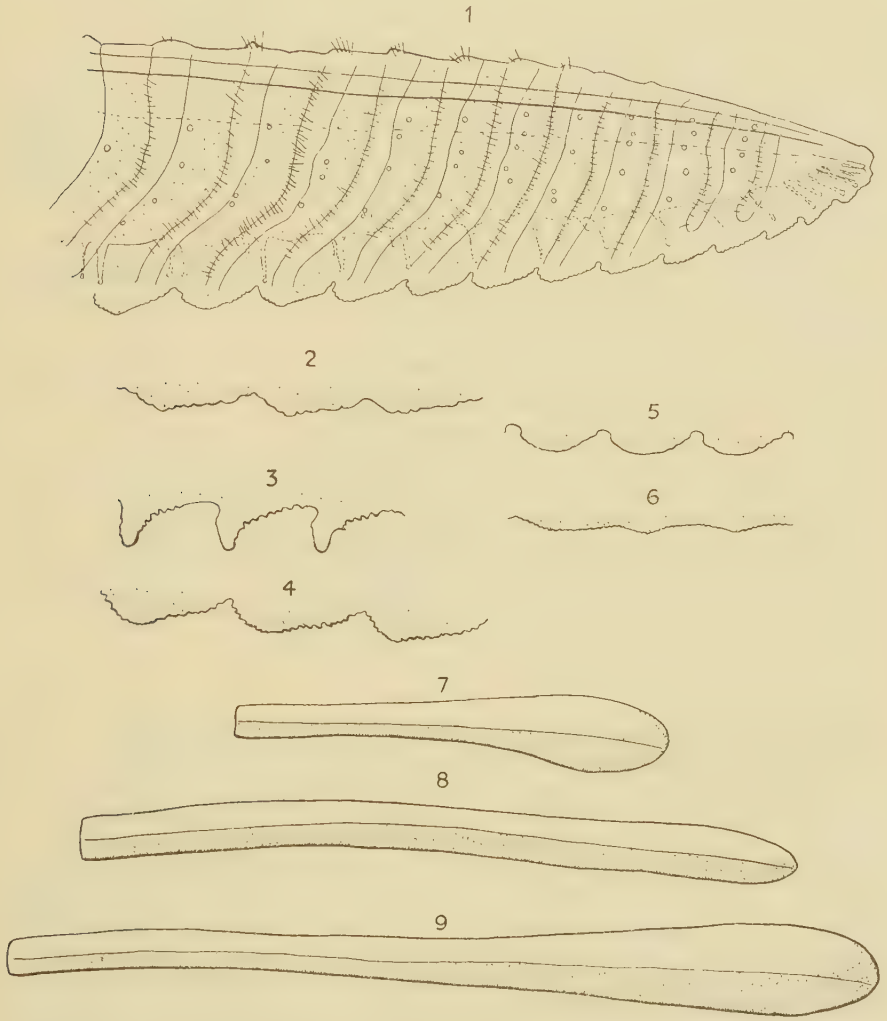


Figs. 1–9.—(1) Saw of *Arge stecki* sp. n. 2–6, 9th, 10th and 11th teeth from apex of saw in: (2) *Arge fuscipennis* (H.-S.); (3) *A. tergestina* (Kriechbaumer); (4) *A. stecki* sp. n.; (5) *A. ciliaris* (L.); (6) *A. nigripes* (Retz.). 7–9, Left ♀ antenna viewed from in front with pubescence omitted, in: (7) *Arge stecki* sp. n.; (8) *A. pagana* (Panzer); (9) *A. fuscipennis* (H.-S.).

NEW SPECIES OF OLD WORLD ENDOMYCHIDAE (COLEOPTERA)

By H. F. Strohecker.
(*Kenyon College.*)

Communicated by Dr. O. W. Richards, F.R.E.S.

In 1938 I acquired by purchase a collection of Endomychidae from O. E. Janson. Included in the lot were: a specimen of *Trycherus bifasciatus* labelled "Gerst. type"; the writing is apparently Gorham's; a specimen of *Amphix femoralis* similarly labelled; a specimen of *A. humeralis* labelled "Bates type"; a specimen of *A. discoideus* labelled "Gerst. type." This last has the status of a neotype.

In amalgamating this collection with that already in my care I have encountered, in both lots, material representing species apparently undescribed. In two instances the specimens are of recorded forms but in each instance the diagnosis was insufficient.

The types and paratypes are in my collection at Kenyon College, Gambier, Ohio.

Eumorphus arrowi sp. n.

E. quadriguttato similis, niger, nitidus; singulo elytro maculis duabus flavis ornato, his fere rotundatis, paulo transversis; pronoto subquadrato, lateribus ad basim leviter sinuatis, angulis posticis acutis; pronoto elytrisque minutissime et sparsim punctatis.

♂. Tibia antica dente interno nullo, ad apicem leviter sinuata; tibia media ad tertium medium dente parvo instructa, versus apicem valde incurvata; tibia postica fere recta; segmento ventrali ultimo spatio laeve elevato longitudine posito, utrinque ciliato, postice excavato; pronoti angulis posticis acute sed breviter productis.

♀. Segmento ventrali ultimo postice rotundate exciso.

Long. 10·0–11·5 mm., lat. 5·0 mm.

Male type, female allotype and four female paratypes bearing the label "Sangir." Another female from Gilolo is referred to this species.

In its general structure and appearance this form is to be referred to the *quadriguttatus* group of the genus *Eumorphus*. It is set apart by the lack of a tooth on the front tibia of the male but this may represent an abnormal condition inasmuch as occasional specimens of other species show the same lack. The smooth elevation on the last ventral segment of the male is also a peculiar feature. The general conformation of the male aedeagus is similar to that of *quadriguttatus* but the lateral spine is shorter, stouter and sharply angulated on its inner edge (fig. 6). The female may be distinguished from the same sex of *quadriguttatus* by the shallower and not at all angulate excision of the last ventral segment. In both sexes the pronotum and elytra are strongly shining; the punctures, even under high magnification (× 48) appear minute and sparse. The species is dedicated to Mr. G. J. Arrow in appreciation of his valuable studies on the Endomychids.

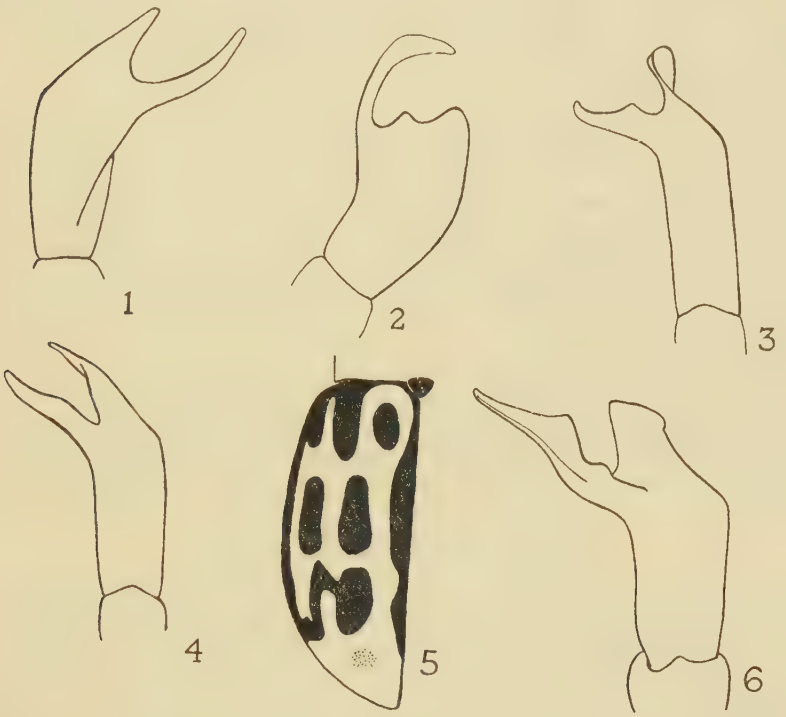
Eumorphus rejectus sp. n.

Eumorphus murrayi Gorham, 1896, *Ann. Mus. civ. Genova* **16**: 294 (*nec* Gorham, 1874).
Eumorphus sanguinipes Arrow, 1925, *Fauna Br. India, Endomychidae*: 304.

Niger vel nigro-violaceus, nitidus; elytro singulo maculis duabus transversis laete flavis; femoribus versus apicem rufis; pronoto elytrisque minute et obsolete punctatis.

♂. Tibia antica ad medium dente magno gerente; tibia media dente nullo, leviter curvata; tibia postica recta, ad apicem intus profunde excisa; segmento ventrali ultimo late v-exciso; segmento dorsali ultimo integro.

Long. 11·0 mm., lat. 5·5 mm.



Figs. 1–6.—1. ♂ aedeagus, *Eumorphus sanguinipes* Guér. 2. ♂ aedeagus, *E. rejectus* sp. n., type. 3. ♂ aedeagus, *Indalmus* (*Ancylopus*) *graphicus* Gorham. 4. ♂ aedeagus, *Indalmus gorhami* sp. n., type. 5. Elytral pattern of *Trycherus maculatus* sp. n., type. 6. ♂ aedeagus, *Eumorphus arrowi* sp. n., type.

Five specimens taken by *L. Fea*, bearing the label "Carin Cheba, 900–1100m. v-xii-88."

These specimens are undoubtedly from the series referred to by Gorham in 1896 and by Arrow in 1925. The species bears a strong resemblance to *E. sanguinipes* Guérin but may be distinguished by the straight hind tibia, inwardly excised at the tip (male) and by the almost parallel sides and decidedly acute hind angles of the thorax (both sexes). In *sanguinipes* (specimens det. Arrow) the sides of the thorax curve inward at the apex and the hind angles are right or slightly acute. The aedeagi of males of the two species show strong dissimilarity (figs. 1 & 2).

Indalmus gorhami sp. n.

Ancylopus graphicus, var. Gorham, 1873, *Endomycici Recitati, Cat. Endomycici*: 41.

"Elytris fuscis, annulo humerali, extus angulato, ac lunula ante apicem flavis, thorace etiam interdum binotata, ♂♀" (Gorham).

There are before me five specimens of *graphicus* from Joko and Jaunde, Cameroons, and six specimens of the new species from the same localities. It is easy to understand how Gorham supposed the latter to represent individuals of *graphicus* with a greater development of black on the elytra. The male aedeagi of the two forms are abundantly distinct (figs. 3 & 4). In the male of *graphicus* the tooth on the fore tibia is nearer the apex than in *gorhami*. From the short series at hand it appears that the colour patterns are adequate for distinguishing the two.

Pseudindalmus biguttatus sp. n.

Latus, valde depressus, totaliter glaber, nitidus; pronoto rufo, lateribus versus basim paulo convergentibus, angulis posticis fere rectis vel parum acutis; elytro singulo ad tertium posterius guttam magnam rufam gerente, hac excepta nigro; subtus, elytrorum epipleuris exceptis, rufus, glaber, nitidus.

♂. Tibia antica ad basim valde curvata, infra medium intus angulariter dilatata; antennarum articulo 9 quam 10 paulo majore; segmento ventrali ultimo late emarginato. Long. 8·0 mm., lat. 3·5 mm.

Type: one specimen bearing the label "Sangir."

Of the known species of the genus this is the only one in which the elytral markings consist of only two spots. These are placed on the posterior third and extend from near the margin almost to the suture; the tips of the elytra are black.

Trycherus maculatus sp. n. (fig. 5).

Flavo-rufus, vix nitidus; pronoto rufo, maculis duabus et area post lineam basalim nigris; elytris valde convexis, singuli sutura, margine externo (quarto ultimo excepto), macula angulata humerali, scutello, macula media basali, strigis duabus brevibus latisque mediis et macula posteriore ad marginem in linea angulata attingente, nigris, apice laeto; subtus piceus; antennis pedibusque nigris; pronoto elytrisque fortissime punctatis.

Long. 9·0 mm., lat. 4·5 mm.

One female specimen (type) bearing the label "Ofudede, N. Nigeria." I have not hesitated to describe this species from a female specimen because of its unusual habitus; indeed it may prove the type of a new genus, but in its general characters it resembles the species of the genus *Trycherus*.

The mandibles are much worn but show an apical cleft; the inner tooth is very stout and blunt. On its outer edge the mandible is sinuate near the tip. The puncturing of the upper surface is much coarser than in other species of *Trycherus* and the elytral markings are wholly unlike those of any other species of the genus. The last segment of the labial palp is transverse, the prosternum moderately broad and prolonged behind the front coxae. The antennae are rather stout and short but not more so than in *T. tricolor* Gerst. The margins of the pronotum are fine, the basal groove broad and deep, the lateral foveae deeply impressed, parallel and reaching almost to the middle of the disc.

A NEW SPECIES OF *ORTHOPODOMYIA* (DIPTERA CULICIDAE)

By F. W. Edwards, F.R.S., F.R.E.S.

Included in a fine collection of Costa Rican mosquitoes recently received from Dr. H. W. Kumm (through Prof. P. A. Buxton) was a series of a species of *Orthopodomyia* which the collector had provisionally determined as *O. albicosta* (Lutz). Comparison with specimens in the British Museum, however, showed that the species has much more resemblance to the North American *O. signifera* (Coq.) than to the South American *O. albicosta*, but is amply distinct from both; it is also evidently distinct from the Jamaican *O. waverleyi* (Grabham) which according to the original description, and the redescription by Howard, Dyar and Knab, seems more likely to be a distinct species than a synonym of *O. signifera*.

The new species is described below as *O. kummi*, in honour of the collector, and a key is appended to the known species of the *Bancroftia* group, *i.e.* those species of *Orthopodomyia* which have the mesonotum adorned with narrow white lines (excluding *O. phyllozoa* (D. & K.) which has quite a different type of ornamentation).

Orthopodomyia kummi sp. n.

♀. *Head* black, erect scales and bristles black; a line of pure white scales bordering eyes and a patch of decumbent white scales on nape. Proboscis black, with numerous scattered white scales but without a white ring. Palpi with scattered white scales and narrow white tip, as usual rather more than one-third length of proboscis. Antennae with a line of white scales dorsally extending whole length of first six segments. *Thorax* black, mesonotum with six narrow lines of white scales as shown in the figure; the posterior pair of lines are very slightly broken at the point where they begin to converge, and the long scales on the margin of the scutellum which form the posterior ends of these lines are about as long as the scutellum. A line of white scales crosses anterior and posterior pronotal lobes, continuing the white line of the head. Another line of white scales, of even width throughout, extends from base of prosternum to posterior edge of mesepimeron. A short line of white scales extends along posterior edge of lower half of sternopleura. Mesonotal bristles numerous and black; numerous small black scales cover much of the surface between the white lines. (This ornamentation of the thorax is very much the same as in *O. signifera*, except that in that species the white scales on the sternopleura are more numerous and form less definite lines.) *Abdomen* with integument of first two segments brownish, rest darker, scales mainly black; a large white median triangle at base of second tergite, following tergites with smaller median basal pale spots, well separated from the lateral pale spots. Venter mainly dark. *Legs* black; femora and tibiae with numerous white scales, which tend to form lines on anterior surfaces of mid and hind tibiae. Tarsi without scattered white scales; front tarsi all dark; middle tarsi with a white ring at base and a small white spot at joint 1–2; hind tarsi with white ring at base and with four other white rings or bands which are hardly complete beneath, those on joints 1–2 and 2–3 broad; fifth segment white above. *Wings* with the scales narrower than in *O. signifera* and mostly black; a line of white scales on *R* from base to base of *Rs*, and a few scattered white scales on *Sc* and *R*1 beyond this.

♂. Resembles ♀ except that the abdominal tergites have complete basal white bands. Palpi straight, slender, equalling proboscis in length.

Wing-length 4–5 mm.

Costa Rica: Orosi, vi.1937 (*H. W. Kumm*). Type ♀, paratypes 4 ♂♂ 3 ♀♀ in British Museum; others in London School of Hygiene and Tropical Medicine.

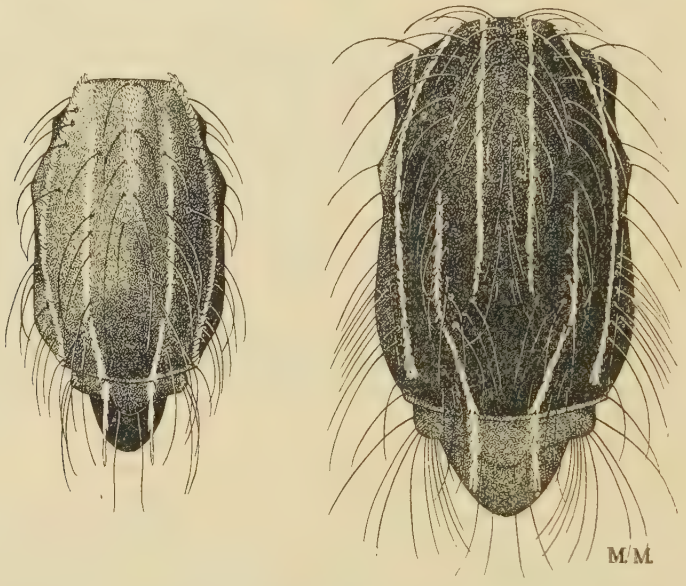


Fig. 1.—Thoracic ornamentation of *Orthopodomyia*: Left, *O. albicosta* (Lutz); right, *O. kummi* sp. n.

Key to species of *Orthopodomyia* (*Bancroftia* group).

1. Thorax dark reddish-brown; mesonotum with only four narrow white lines, surface largely bare but with three stripes of brown scales, accompanying the dorso-central and acrostichal bristles; long white scales on margin of scutellum much longer than scutellum; abdominal tergites all dark above (♂♀); hind femur and tibia with conspicuous white anterior lines; ♂ palpi shorter than proboscis; flagellum of ♀ antenna without scales; wings dark except for a line of white scales on *R* (Brazil, Venezuela) *albicosta* (Lutz).

   Thorax blackish; mesonotum with six or eight narrow white lines, surface mainly covered with small blackish scales; long white scales on margin of scutellum about as long as scutellum; abdominal tergites with basal white spots or bands; legs less obviously lined with white; ♂ palpi about as long as proboscis . . . . . 2.

2. Mesonotum on posterior half with two pairs of white lines between the marginal lines, the outer pair straight and extending back to scutellum; proboscis dark, with a narrow white ring beyond middle; wing-scales not very broad, black, with a short white line at base of *R*; antennal flagellum of ♀ without scales (Europe) . . . . . *pulchripalpis* Rond.

   Mesonotum and wings otherwise; proboscis with white scales tending to form lines, but without white ring (America) . . . . . 3.

3. Mesonotum on posterior half with a pair of short curved white lines which are quite disconnected from the convergent pair which cross the scutellum (Jamaica) . . . . . *waverleyi* (Grabham).
   Mesonotum on posterior half with a pair of short straight lines which are almost continuous with the convergent pair which cross the scutellum; antennal flagellum of ♀ with a line of white scales above extending along first five or six segments . . . . . 4.
4. Wing scales narrower and mostly blackish, a long white line on *R*; abdominal tergites unbanded in ♀ (Costa Rica) . . . . . *kummi* sp. n.
   Wing-scales broader, mixed black and white, no white line on *R* but a white patch over cross-veins; abdominal tergites banded (♂♀) (U.S.A.) . . 5.
5. Second abdominal tergite with a complete dark band posteriorly *signifera* (Coq.).
   Second abdominal tergite mainly white, the dark posterior band interrupted in middle . . . . . *alba* Baker.

AFRICAN BEES OF THE GENUS *NOMIA* (HYMEN.)

By T. D. A. Cockerell, F.R.E.S.

(*University of Colorado.*)

The bees recorded in this paper will be found in the collection of the British Museum, excepting *N. wallacei*, which is at Oxford.

(A.) The following species of *Nomia* have the tegulae small, or not much enlarged.

Nomia clavigera sp. n.

♂. Length about 6·0 mm., anterior wing 5·4; black, with a strongly clavate abdomen, broad and rounded in middle, greatly narrowed at base; head rather broader than long; face densely covered with pale yellowish hair; mandibles red except basally; flagellum long, dull red beneath; vertex entirely dull; thorax with pale greyish hair on margin of pronotum, tubercles, pleura and postscutellum; mesonotum dull, a little shining on disc; the notauli conspicuous as shining lines; scutellum shining, especially in front; area of metathorax basally dull and rugose, posteriorly shining; posterior truncation dull; tegulae very dark brown, not enlarged; wings very long, basally hyaline, the apical part strongly dusky; stigma dark brown, nervures brown; second cubital cell receiving recurrent nervure about middle; legs simple, black, the tarsi brownish, hind femora rather stout; abdomen dullish, except the shining brownish hind margins of tergites; tergites 2 to 5 with apical bands of white hair, broadly interrupted on second and third; fourth sternite mainly covered with light red tomentum.

Cape Province: Upington, alt. 2800 ft., 21.ii.1934 (*L. Ogilvie*). Related to *N. ekuivensis* Ckll., from Benguella, but considerably smaller, and differing in various details of coloration. Another related species is *N. clavata* (Smith), from Sierra Leone (*Morgan*), which has the face narrow, inner orbits concave above. It was described under *Halictus* in 1853.

Nomia wallacei nom. n.

Nomia clavata Smith, 1861, *nec Halictus clavatus* Smith, 1853.

Gilolo, Moluccas. I have examined the type, which is at Oxford.

Nomia laticinctula sp. n.

♀. Length 8·0 mm., anterior wing nearly 6·0; black, including legs, except that the tarsi are red at apex, and in the type the front and middle knees are bright red, but this is not apparent in some other specimens; head broad, the face covered with creamy-white hair, not distinctly yellow; mandibles red in middle; flagellum red beneath; vertex dull; hair of thorax creamy-white, but distinctly fulvous on scutellum and hind border of mesonotum; mesonotum closely punctured, but shining on disc; scutellum very hairy, a little shining on disc; postscutellum with dense creamy-white tomentum; channel at base of metathorax rather broad, glistening with fine but very distinct plicae; the area is triangular, pointed behind; tegulae moderately large, pale testaceous, translucent; wings yellowish hyaline, with very pale reddish stigma and nervures; second cubital cell broad, receiving recurrent nervure beyond middle; hind tibiae anteriorly with abundant silvery white hair; abdomen dull, first tergite with a pallid margin, or it may be all dark, at sides with some white hair; second tergite with a thin and rather narrow fulvous hair-band; tergites 3 to 5 with very broad bands of dense fulvous tomentum, the apex coloured the same; venter with much glittering pale hair.

S.W. Africa: Otavi, 24–26.xii.1933, many specimens (*J. Ogilvie, L. Ogilvie*). Superficially similar to *N. emicata* Ckll., which has a quite different base of metathorax, and the face not covered with hair. There is some resemblance to *N. somereni* Ckll., which has red legs. In my 1935 table it could run near *N. opacibasis* Ckll. or *N. umbiloensis* Ckll., but is quite distinct from both. The first tergite is moderately shining, and it would run to *N. nitidibasis* Ckll. in my Natal table (1920), but that is a much larger species.

Nomia opacibasis sublucens subsp. n.

♀. Differs by the shining mesonotum, with very distinct punctures; second tergite more strongly punctured, white hair-band on third narrower, apical part of fourth with little pale hair. The legs are black, with front and middle knees red, and tarsi red at end. The red hair at end of abdomen is exactly as in the much larger *N. pyrura* Ckll. The scutellum is dull.

Bechuanaland: Palapye Road (type locality), 8 ♀♀, 4–6.iii.1934 (*J. Ogilvie, L. Ogilvie*). S.W. Africa: Otavi, 1 ♀, 27.xii.1933 (*J. Ogilvie*). A rather weak race, but distinguishable.

Nomia matophila sp. n.

♀. Length 7·3 mm., anterior wing 7·2 mm.; black, robust, with oval abdomen; mandibles black; the stout flagellum red beneath, and at extreme tip above; hair of head and thorax greyish-white; head broad; face with thin hair; clypeus dull and very densely punctured, the upper margin shining; vertex moderately shining; mesonotum polished with fine punctures; scutellum shining, not bigibbous, not hairy; a rather broad band of pale hair along hind margin of mesonotum, the usual hair on axillae, and postscutellum densely covered with pale tomentum; area of metathorax with very fine regular plicae, the area a narrow band at sides, but in middle produced downward to an acute angle; tegulae fulvous, dark at base, not enlarged; wings very ample, dusky hyaline, not darker at apex; stigma very large, pale red; nervures pale brown; second cubital cell about square, receiving recurrent nervure about middle; legs black, only the tips of the tarsi red; underside of hind tibiae with long silvery hairs; abdomen moderately shining, but not polished; first tergite with a white hair-band, broad at sides, linear in middle; tergites 2 to 4 with rather broad bands of white hair; margin of fifth faintly reddish.

S. Rhodesia: Matopo Hills, 17–30.iv.1932 (*Alice Mackie*). Related to *N. albidula* Friese, which has the fifth tergite dark-haired, and also to *N. seminitens* Ckll. In Strand's table it runs to *N. halictiella* Strand (*N. pseudohalictiella* Strand), which has different legs.

Nomia gobabica sp. n.

♀. Length about 7·0 mm., anterior wing 6·2; black, robust, with long-oval abdomen; mandibles red in middle; flagellum bright red beneath; hair of head and thorax white, dense and pure silvery-white on face, dense on postscutellum and axillary marks, but no band on hind border of mesonotum; head broad, quite large; clypeus dull, a shining line along lower edge of supraclypeal area; vertex hardly shining, the occipital margin very near to ocelli; mesonotum and scutellum shining, not evidently hairy; scutellum with a median groove; area of metathorax broadly triangular, narrow at sides, with minute plicae; tegulae testaceous with dark base, and outer margin hyaline and colourless; wings clear, very faintly dusky apically; stigma small, pale orange; nervures pale; second cubital cell a little broader than high, receiving recurrent nervure a little beyond the middle; legs black, with white hair, the tarsi red only at tip; hair on inner side of hind basitarsi shining white; abdomen moderately shining, the tergites with pallid margins; tergites 1 to 5 with pure white hair-bands, on first only at sides, on second very slender and weak in middle, on the others broad and entire; apical plate (often concealed) fulvous, with a black line down the middle and black margins, while at its base is a broad fringe of pale reddish hair, though on each side of it is a pencil of pure white hair.

S.W. Africa: Gobabis, alt. 4647 ft., 8 ♀♀, 16.xii.1933 (*J. Ogilvie, L. Ogilvie*). The locality is printed "Gobasis" on the labels. It differs from *N. bellicornis* Friese by the white hair-band on fifth tergite; from *N. pygmaea* Friese by the more shining mesonotum. The following key separates a series of similar species (females):—

Scutellum with red hair; abdomen with broad bands of pale red tomentum	*laticinctula* Ckll.
Scutellum without red hair	1.
1. Scutellum dull; flagellum red beneath	*opacibasis sublucens* Ckll.
Scutellum at least partly shining	2.
2. Head large; stigma small	*gobabica* Ckll.
Head ordinary; stigma very large	*matophila* Ckll.

Nomia bechuanella sp. n.

♀. Length 6·2 mm., anterior wing 4·0 mm.; black, moderately robust, the head broader than long; face, sides of front, and cheeks with pure white hair; mandibles faintly reddish apically; flagellum clear red beneath; clypeus dull, hairy; a shining band across top of head behind ocelli; hair of thorax white at sides, but fulvescent dorsally, the scutellum thinly but evidently hairy; a white axillary mark at each side of scutellum, and postscutellum with a white band, interrupted in middle; area of metathorax minutely punctate or reticulate, not plicate, the sculptured area not extending backward in middle; mesonotum and scutellum dull; tegulae small, pale rufotestaceous; wings short, dusky, stigma small and very pale yellowish, nervures pale, second cubital cell very small; legs black, the tarsi red apically; femora and tibiae carrying much pollen; abdomen moderately shining, the hind margins of tergites pallid; first tergite with a narrow pale apical band; second to fourth with increasingly wide bands of fulvous tomentum, the last band may or may not be somewhat paler than the others; fifth tergite with dark fuscous hair; apical plate with appressed bright copper-red hair.

Bechuanaland: Palapye Road, 4.iii.1934, 3 ♀♀ (*J. Ogilvie*). Related to *N. microsoma* Ckll. and *N. pygmaea* Friese, but known by the dull mesonotum. In having the fifth tergite with dark hair it resembles *N. albidula* Friese. A female from Otavi, 27.xii.1933 (*J. Ogilvie*) is larger, without any red at end of abdomen; it is referred to *N. albidula* Friese, as it agrees sufficiently with the original description and with my notes on a specimen determined by Friese; but it is in poor condition, and the locality is more than a thousand miles from the type locality of *N. albidula*, so it is not unlikely that more and better material would show distinctive characters.

Nomia rufitarsis pulchella (Friese).

S.W. Africa: Otavi, 29.xii.1933 (*J. Ogilvie*).

Nomia pygmaeola sp. n.

♀. Length about 5·0 mm., anterior wing about 3·5 mm.; black, robust, with broad abdomen; head broad, face and sides of front with white hair; greater part of mandibles red; flagellum red beneath; clypeus dull, the apical part with a broad depression, on each side of which, at the margin, is a small brilliantly shining spot, but to see these spots it is necessary to view the face from somewhat below; vertex dull, but a shining space at each side of ocelli; mesonotum and scutellum with little hair, no band along hind margin of mesonotum, which is shining and distinctly punctured; scutellum shining, with a slight median depression; postscutellum with dense creamy-white hair; area of metathorax with a narrow band crossed by plicae, the area beyond punctate, the punctures running in lines; tegulae very small, fulvous; wings strongly dusky, stigma very pale reddish; nervures brown, second cubital cell very broad, receiving recurrent nervure beyond middle; legs black, with the small joints of tarsi red, tibiae also more or less reddened apically; hair of hind tibiae white; abdomen short and broad, the tergites with narrow pallid margins; hair-bands fulvescent, but pale, at sides only of first two tergites, entire on third and fourth, and apex also with light fulvous hair.

S.W. Africa: Gobabis, 17.xii.1933 (*J. Ogilvie*). A peculiar little species, to be compared with two others as follows:

Margins of tergites black, the last two black-haired
inaequalis Friese (*inermis* Friese).
Margins of tergites pallid . . . . . 1.
1. Mesonotum very finely punctured, somewhat shining . . . *pygmaea* Friese.
Mesonotum strongly punctured, shining . . . . . *pygmaeola* Ckll.

Nomia laticincta [Friese MS.] sp. n.

♀. Length about 9·0 mm., anterior wing 6·6 mm.; black, robust, mandibles red in middle, flagellum bright red beneath; hair of face, cheeks, pleura and metathorax greyish-white, of vertex slightly fulvous, of mesonotum pale greyish fulvous (no black hairs), of scutellum ferruginous; head broad, orbits strongly converging below; clypeus with only the upper part distinctly hairy, surface of clypeus shining, strongly punctured, with a broad depression in middle so that clypeus is distinctly bigibbous; a shining spot in front of anterior ocellus on each side; mesonotum and scutellum entirely dull; metathorax hairy all over, the basal area very small; tegulae rather large, fulvous, with a shining margin; wings dusky, with no distinct apical cloud; stigma small, very dark brown; second cubital cell broad, receiving recurrent nervure much beyond middle;

legs very dark brown, middle femora with a tooth beneath near base; hind tibiae and tarsi light red, except that the basitarsi have an apical cloud, and the next two joints are dark; abdomen dullish, the first tergite quite dull, hind margin of first tergite narrowly pallid, of second to fourth broadly so, with thin white hair-bands, on second and third the lower margin of black area is reddened; fifth tergite with very dark brown hair, white at extreme sides, apex with dark hair; venter reddish.

Portuguese E. Africa: Rikatla, Delagoa Bay (*Junod*).

Nomia laticincta mafekingensis subsp. n.

♀. Length about 9·0 mm., anterior wing 7·0 mm., similar to *N. laticincta* Ckll., so that it seems best to regard it as a local race, but it differs thus: clypeus less shining, not evidently bigibbous; flagellum dark, obscurely reddened beneath; hair of mesonotum pale yellowish-grey, strongly contrasting with the bright red of scutellum (thus resembling *N. murinella* Ckll.); nervures very dark, second cubital cell higher than broad; hind basitarsi with about the apical half dark; first tergite without a distinct pale border; second tergite with a broad red margin, and no distinct hair-band.

Cape Province: Mafeking, 1.iii.1934 (*J. Ogilvie*).

For many years I have had *N. laticincta* in my collection, but no description has been published, so far as I can learn. It is very close to *N. murinella* Ckll., differing in the colour of legs and tegulae; possibly it should be regarded as a race of *N. murinella*. There is also much resemblance to the larger, more robust, *N. natalensis* Ckll., which does not have the very hairy metathorax, and has dark hind basitarsi. The hairy metathorax associates *N. laticincta* with *N. perornata* Ckll. and *N. somereni* Ckll., species which have the wings with a strong dark hind margin.

Nomia sanguinolenta Friese.

♂. Length about 8·0 mm., anterior wing 6·0 mm.; antennae black, very faintly brownish beneath; face with greyish-white hair; clypeus dull and densely punctured; front shining; vertex brilliantly polished, impunctate; mesonotum shining, with three conspicuous impressed lines at anterior middle; scutellum shining; greyish hair before and behind scutellum; tegulae pellucid, almost colourless, not enlarged; wings hyaline, stigma very dark brown, nervures dark; in the Okahandja specimen the second cubital cell is excessively narrow; legs black, the tarsi pale reddish, more or less stained with blackish; hind femora very stout, but rounded above; hind tibiae greatly broadened apically, the inner apical corner with a red spine; first two tergites orange-fulvous, with a large black saddle, that on second much the longest; the remaining tergites black, with the hind margin pallid, the fourth and fifth with thin white hair-bands; apical plate very broad, light red; venter with patches of greyish-white tomentum.

S.W. Africa: Okahandja, 22.i.1934 (*L. Ogilvie*); Otavi, 27.xii.1933 (*L. Ogilvie*. I refer this to *N. sanguinolenta*, previously known only in the female, as it comes from the same region, and seems to differ only as the male might be expected to do.

Nomia epileuca sp. n.

♀. Length about 9·5 mm., anterior wing 7·0 mm.; black, robust, the first four tergites with broad dull white tegumentary bands, that on first narrowest; head broad; face and front with dull white hair; clypeus dull, somewhat depressed in middle, from beneath its lower margin are long flavescent hairs; supraclypeal area dull, the lower edge narrowly

shining; mandibles obscurely reddish in middle; flagellum rather dusky red beneath; region of ocelli shining; mesonotum and scutellum bare, dull, feebly shining, with extremely minute punctures; along the anterior margin the mesonotum has a band of flavescent tomentum, widely interrupted in middle, and extending narrowly along sides; postscutellum with abundant long pale hair; area of metathorax triangular, dull, not evidently sculptured, but the microscope shows fine plicae at the sides; posterior truncation with little hair; tegulae rather large, pale translucent testaceous; wings strongly dusky, stigma small, dark brown, nervures brown; second cubital cell large, but higher than wide, receiving recurrent nervure a little beyond the middle; legs black, the tarsi reddened at apex, the tarsi have red hair on inner side; abdomen moderately shining, the hair at apex dense and pale fulvous; venter with bands of red hair.

S.W. Africa: Seeheim, 19.ii.1934 (*J. Ogilvie*). Related to *N. leucophara* Ckll., but smaller, with hair of thorax different. It differs from *N. emicata* Ckll. by the white band on first tergite, and the hair of thorax.

Nomia matha (Cameron) subsp. **breviceps** subsp. n.

♂. Head remarkably broad and short, the face densely covered with long hair, which is shining white on clypeus, flavescent around antennae; antennae black, rather short for a male; anterior and middle knees, anterior tibiae, middle tibiae at base and apex, hind tibiae except a large black mark in middle, and all the tarsi, clear red; hind legs not modified, the tibiae have a strong dentiform angle on inner side at apex; abdomen with narrow pale, slightly flavescent, hair-bands; tergites gibbous before the apex, the third and fourth in lateral view thorn-like, with a projecting point; fourth sternite with a pair of tubercles close together in the middle. Wings dark fuliginous, stigma light red.

" S.W. Africa: Cape Town, Beaufort West, 28.xi.1933 " (*J. Ogilvie*).

This is certainly a male of the *N. matha–rugicollis* series, only known hitherto from females. A female of the *N. matha* type came with the same data. *N. rugicollis* Friese appears not to be strictly identical with *N. matha*, and what I have as *N. matha* is not exactly like the type. Probably there are several races or closely allied species. The type locality of *N. matha* (which Cameron describes as having the stigma black) is Brak Kloof; I examined what purports to be the type, in the British Museum. Dr. H. Brauns found a specimen marked type in the Grahamstown Museum, and said it was a *Colletes*. Both Cameron and Friese put type labels on all the specimens before them when describing, and it is not rarely found that " types " belong to different species. When I visited Alfken in Bremen in 1927, he suggested that he and I should go to Berlin, and study the Friese collection, designating holotypes for all the species. This was and is very desirable, but was not found practicable. The type locality of *N. rugicollis* (now designated, from the three cited) is Lovedale, which is a mission station at Alice, 1720 ft. alt., rainfall about 28 inches.

Nomia trichonota sp. n.

♂. Length about 11·0 mm., anterior wing 8·0 mm.; black, with the very long flagellum dusky red beneath, the legs dark, with tarsi red at apex, and the hind tibiae with a broad, pointed pale yellow apical lobe; mandibles faintly reddened apically; head broad, eyes converging below; face and lower part of front densely covered with clear white hair; cheeks with long white hair; mesonotum, scutellum and postscutellum with abundant pale flavescent (varying to distinctly fulvescent) hair, the hair in region of scutellum long and thick; mesonotum and scutellum dull, the surface almost hidden;

metathorax very hairy, the basal area a narrow inconspicuous channel; tegulae testaceous, rather large, but not of the greatly enlarged type; wings hyaline, not at all reddish, or clouded at apex; stigma small, dusky reddish; nervures brown, second cubital cell nearly square, receiving recurrent nervure beyond the middle; legs with much pale hair, anterior tarsi not fringed; hind femora greatly enlarged, trigonal, the hump beyond the middle, the lower side with a strong subapical dentiform angle; hind tibiae stout but not dentate, with a pale apical lamella; abdomen parallel-sided, the basal part pale red beneath; second and following tergites with pellucid margins; first tergite covered with long pale hair, the others with thin slightly fulvescent hair, not forming distinct bands; in the type the fourth tergite is extended, showing at its base an even fringe of pure white hair, which would ordinarily be concealed; fourth sternite deeply emarginate apically.

S.W. Africa: Seeheim, 19.ii.1934, 2 ♂♂ (*J. Ogilvie*). In my tables it runs near *N. umbiloensis* (Ckll.), but the colour of the wings is quite different. There is some resemblance to *N. magniventris* Friese, from Abyssinia, but no very close affinity.

Nomia amatha Cockerell.

S.W. Africa: Otavi, 5.i.1934, one ♀, with face narrower than typical (*J. Ogilvie*). In my report (1935) on the bees of the Verney–Lang Kalahari Expedition I described three new species of *Nomia*. All three were obtained by the Ogilvies in S.W. Africa; *N. amatha* as above, *N. leucomelanura* (represented by a variant form *nosobina* Ckll.) at Gobabis, *N. ablusipes* at Okahandja.

Nomia trilineata Cockerell.

S. Rhodesia: Shangani, De Beers Ranch, 8–12.v.1932, one ♀, a little larger than typical (*J. Ogilvie*).

Nomia crudelis Westwood.

Belgian Congo: Kabinda (*J. Bequaert*).

(B.) The following species have greatly enlarged tegulae :—

Nomia interstitinervis auricauda subsp. n.

♂. Similar to *N. lebrunae* Ckll., from the west shore of Lake Albert, but differing thus: mandibles red; postscutellum with white hair; apical part of metathoracic area not polished; boss of tegulae not black; stigma clear pale reddish; front tibiae and apical half of middle tibiae red, hind tibiae red with a black mark; hair on first tergite, and basal bands of tergites, white; broad band of tomentum on fifth tergite pure white; tergite six with tegument bright orange except at base. In the South African fauna this will be known by the face densely covered with cream-coloured hair; flagellum bright ferruginous beneath; mesonotum shining, with strong punctures, dense in middle; boss of tegulae pale fulvous, sometimes blackened on inner side; scutellum not spined; first recurrent nervure meeting intercubitus; third to fifth tergites with basal as well as apical hair-bands; hind tibiae short and broad, with an immense white apical lobe; middle tarsi thickened and intense black at apex, but not fringed.

Cape Province: Upington, 2800 ft. alt. (type locality), 21.ii.1934, 3 ♂♂ (*J. Ogilvie*). S.W. Africa: Usakos, 16.i.1934, 4 ♂♂ (*J. Ogilvie, L. Ogilvie*).

From Upington come also three females of *N. interstitinervis* Strand, with pure white hair on face, and much larger, well-separated punctures in middle

of mesonotum. In spite of such differences, I am now persuaded that the male pertains to *N. interstitinervis* in a broad sense, that widely ranging species presenting different subspecies in different parts of its range, these being recognisable by the characters of the male. It is noteworthy that when Mdme. Le Brun took *N. lebrunae* (male) at Kasenyi, she also took, on the day before, female *N. interstitinervis*. There is accordingly :

N. interstitinervis Strand (male, *N. guineaella* Strand). Guinea.
N. interstitinervis lebrunae (Cockerell). Dist. Kibali Ituri, Belgian Congo.
N. interstitinervis auricauda Cockerell. S.W. Africa and Cape Province.

Strand's male was in bad condition, and could not be adequately described.

Nomia aurifera Cockerell.

Kivu District : Uvira, 1931 (*Cockerell*); Lomami District, Kabinda (*J. Bequaert*). Fresh specimens have the postscutellum densely covered with fulvescent tomentum, as shown by the Kabinda example.

Nomia atrinervis Vachel.

Belgian Congo : Kabinda (*J. Bequaert*); Portuguese E. Africa : Beira (*L. Ogilvie*); S. Rhodesia : Victoria Falls (*J. Ogilvie*). The last is more robust than the others. From Kabinda come also two males of *N. stanleyi* (Ckll.), which is probably the male of *N. atrinervis*.

Nomia rhodacantha Cockerell.

S.W. Africa : Okahandja, 24.i.1934 (*J. Ogilvie*). One male, about 7·0 mm. long, front wing about 5·7 mm. This is smaller than the type, which came from near Lake Kivu, but in spite of the widely different locality, I cannot find characters indicating a different species.

Nomia bevisiana Cockerell.

Natal : Weenen, ii.1925, 2 ♂♂ (*H. P. Thomasset*). The end of the abdomen has a pair of widely separated thorn-like teeth, and a truncate pale red lobe in the middle, but these structures may be wholly concealed. In fresh specimens the third and fourth tergites carry broad bands of pale tomentum. The mesonotum has a conspicuous covering of fulvescent hair.

Nomia durbanensis mesosticta subsp. n.

♀. Length about 6·5 mm., anterior wing 5·8 mm.; a small black species with enlarged tegulae, which are whitish with a very large black boss; sides of face with conspicuous white hair, but clypeus very thinly hairy; mandibles black with a faint red subapical spot; flagellum red beneath except basally; a cuneiform shining space at each side of ocelli; prothorax with dense dull white tomentum; mesonotum shining but not polished, with very widely scattered strong punctures; no hair-band between mesonotum and scutellum; scutellum dullish, with very large punctures; postscutellum covered with slightly fulvescent tomentum; basal channel of metathorax very narrow; sides of metathorax above not shining; wings hyaline, dusky at apex; stigma dull reddish, very obtuse at end; nervures brown; second cubital cell higher than broad, receiving recurrent nervure near end; basal nervure very strongly bent; legs black, the tarsi rufescent apically, hind basitarsi dusky reddish; first tergite all black, with a pair of very distinct

hair-spots, no line of punctures before depression; second to fourth each with two bands, the apical band on second slender, on third broader, on fourth very broad, all white; apex with dark brown hair. Quite distinct from *N. hadrosoma* Ckll. by the paler wings and tegulae, but much like *N. atrinervis* Vachel, from which it is easily distinguished by the glistening clypeus and supraclypeal area, with large punctures. *N. cinerea* Friese differs at once by the polished mesonotum and shining upper margin of truncation of metathorax. *N. aloephila* (Ckll.) is very similar, but smaller, with a much shorter clypeus. The closest affinity appears to be with *N. durbanensis* Ckll., from which it differs by the very strong conspicuous punctures on anterior part of mesonotum, in the region of the longitudinal lines, the larger scutellum and the darker antennae. It seems best to treat it as a subspecies of *N. durbanensis.*

S. Rhodesia : Matopo Hills, 17–30.iv.1932 (*Alice Mackie*).

Nomia macrozona sp. n.

♀. Length about 8·0 mm., anterior wing 6·4 mm.; very robust, black, with the hind tibiae and tarsi bright ferruginous; mandibles black, obscurely reddish apically, with a strong longitudinal channel; head very broad; sides of face and front with coarse dull white hair; clypeus and supraclypeal area shining, well punctured, the punctures in middle of clypeus not dense, running more or less in transverse lines; vertex dull, with a little shining space at each side of ocelli; flagellum dusky red beneath; prothorax and tubercles densely covered with greyish-white tomentum; thorax above with very thin dull white hair; no band between mesonotum and scutellum; postscutellum with dense pale fulvescent hair, but its hind margin exposed; mesonotum and scutellum entirely dull, the microscope shows a minutely granular surface, and small well-separated punctures; basal channel of metathorax very slender; sides of metathorax not at all polished, but with a silky lustre; tegulae enlarged, brownish-white, with a large black boss; wings hyaline, a little dusky at apex; stigma reddish-brown, nervures pale brown, second cubital cell about square, first recurrent nervure meeting intercubitus; legs mainly dark brown, rufescent apically, hind tibiae and tarsi red; hind tibiae externally with silky white hair; hair on inner side of tarsi golden; abdomen broad, shining, first tergite anteriorly with long pale hair, but no hair-spots, or transverse hair-band, but hind margin with a pale hair-band, interrupted in middle; anterior to the depression on first tergite are irregularly placed strong punctures; tergites 2 to 4 with no basal bands, but with very broad apical bands of greyish-white tomentum, sparsely overlaid by long glittering hairs; apex with reddish-brown hair, white at extreme sides.

S. Rhodesia : Matopo Hills, x.1931, 3 ♀♀ (*J. Ogilvie*). Recognised by the entirely dull mesonotum, and the very broad abdominal bands, the basal bands of tergites lacking. In Strand's table it runs to *N. schubotzi* Strand, but it is really quite different. In my table it runs near *N. anthidioides* Gerst., but the abdomen is not at all as in that species. Friese's *N. arnoldi,* from the same region, is based on the male, but is evidently different. I saw *N. arnoldi* in the Bulawayo Museum, and noted : larger than *N. albitarsis* Friese, abdomen broad, with five white bands; flagellum red beneath, black at end; basitarsi pale yellow. Thus very near *N. meadewaldoi,* but much more robust.

N. umtalica Ckll. is related to *N. macrozona.*

Nomia usakoa sp. n.

♀. Length 7·2 mm., anterior wing 5·0 mm., robust, black, legs dark, with the hind basitarsi reddened basally, and the apical joint of hind tarsi red; mandibles with the

apical half red; head very broad, with pure white hair at sides of face and front; clypeus dull, very finely and densely punctured, the upper part with a median depression, the lower part with a transverse area, the lower edge of which is shining, and on each side a somewhat elevated area, with coarser punctures; flagellum obscurely reddish beneath; prothorax with pure white hair, but the tubercles partly exposed, pale red; thorax dorsally bare, except that the postscutellum is covered with white tomentum; some very minute hairs between mesonotum and scutellum; mesonotum and scutellum dull, with sparse punctures, channel at base of metathorax linear, without plicae; metathorax dull, a little shining at sides; tegulae greatly enlarged, dull white with a light brown boss, marked with black on inner side; wings hyaline, not dusky apically; stigma pale ferruginous; nervures brown, second cubital cell square, first recurrent nervure joining third cubital cell, a short distance from base; abdomen broad, dullish; margins of tergites brown; first tergite with erect hair at extreme base, but no band or hair-spots, there are no evident punctures except a row just before the broad apical depression; second tergite with a shining channel at base, and a row of punctures before the apical depression, which shows some widely spaced appressed glistening hairs; third tergite greyish from a very thin covering of very short hairs, and with a narrow white hair-band at base; fourth with white hair on the raised portion, the depressed part with the tegument pale fulvous; apex with pale, faintly fulvescent hair.

S.W. Africa: Usakos, 16.i.1934 (*J. Ogilvie*). A distinct species, differing from *N. tangensis* Ckll. by the larger scutellum and quite different abdomen; from *N. umtalica* Ckll. by being smaller, with quite different abdomen. In Strand's table it runs to *N. schubotzi* Strand, but it is not that at all.

Nomia cinerea Friese, variety.

♀. Hair-bands on first three tergites flavescent, the very broad band on fourth pure white, contrasting; upper half of clypeus densely covered with white hair. The hair at apex of abdomen is very pale reddish; the lower part of area of metathorax is polished; scutellum with strong punctures on a shining ground (which excludes *N. granularis* Ckll.); in the Gobabis specimen the hind tibiae and all the tarsi are red, the basitarsi stained with blackish; in the Belmont one the legs are darker, the front and middle basitarsi blackish, but the middle ones red at base.

Cape Province: Belmont, 23.ii.1934 (*J. Ogilvie*). S.W. Africa: Gobabis, 17.xii.1933 (*L. Ogilvie*). This is a weak race or variety of *N. cinerea*, which seems not to deserve a special name. A specimen from Mafeking, 1.iii.1934 (*J. Ogilvie*) also has dense white hair on clypeus, but it is remarkable for the dark flagellum, very feebly rufescent beneath. The abdomen has been wetted, and the colour of its pubescence cannot be described.